

WHAT IS CLAIMED IS:

1. An electrochemical cell comprising an anode comprising anode active material, an aqueous alkaline electrolyte solution, a separator, and a cathode comprising copper hydroxide, graphitic carbon and a sulfur additive selected from the group consisting of sulfur and sulfur compounds.

2. An electrochemical cell comprising an anode comprising anode active material, an aqueous alkaline electrolyte solution, a separator, and a cathode comprising copper hydroxide, graphitic carbon and sulfur.

3. An electrochemical cell comprising an anode comprising anode active material, an aqueous alkaline electrolyte solution, a separator, and a cathode comprising copper hydroxide additive, sulfur, and expanded graphite.

4. The cell of claim 3 wherein the cathode comprises said copper hydroxide additive and a portion of said aqueous alkaline solution.

5. The cell of claim 3 wherein the anode active material comprises zinc.

6. The cell of claim 3 wherein the electrolyte solution comprises potassium hydroxide.

7. The cell of claim 3 wherein said expanded graphite comprises between about 3 and 10 percent by weight of the cathode.

8. The cell of claim 3 wherein the cathode comprises between about 1 and 15 percent by weight sulfur.

9. The cell of claim 3 wherein said copper hydroxide additive comprises at least 90.0 percent by weight copper hydroxide.

10. The cell of claim 3 wherein said copper hydroxide additive comprises between 90.0 and 99 percent by weight copper hydroxide.

11. The cell of claim 9 wherein the cathode comprises between about 65 and 90 percent by weight copper hydroxide.

12. The cell of claim 3 wherein the copper hydroxide additive is in particulate form having an average particle size between about 1 and 100 micron.

13. The cell of claim 3 wherein the cathode comprises less than 100 parts total of iron and chromium per million parts by weight of said cathode.

14. The cell of claim 3 wherein said cell comprises less than 50 parts by weight mercury per million parts total cell weight.

15. An electrochemical cell comprising an anode comprising anode active material, an aqueous alkaline electrolyte solution, a separator, and a cathode comprising copper hydroxide additive, carbon nanofibers and sulfur.

16. The cell of claim 15 wherein the cathode comprises said copper hydroxide additive and a portion of said aqueous alkaline solution.

17. The cell of claim 15 wherein the anode active material comprises zinc.

18. The cell of claim 15 wherein the electrolyte solution comprises potassium hydroxide.

19. The cell of claim 15 wherein said carbon nanofibers have a mean average diameter between about 50 and 300 nanometers.

20. The cell of claim 15 wherein said carbon nanofibers have a mean average length between about 0.5 and 300 micron.

21. The cell of claim 15 wherein said carbon nanofibers comprises less than 200 million parts by weight metal per million parts carbon.

22. The cell of claim 15 wherein said carbon nanofibers comprises between about 3 and 10 percent by weight of the cathode.

23. The cell of claim 15 wherein said carbon nanofibers are graphitic carbon nanofibers.

24. The cell of claim 15 wherein the cathode comprises between about 1 and 15 percent by weight sulfur.

25. The cell of claim 15 wherein said copper hydroxide additive comprises at least 90.0 percent by weight copper hydroxide.

26. The cell of claim 15 wherein said copper hydroxide additive comprises between 90.0 and 99 percent by weight copper hydroxide.

27. The cell of claim 25 wherein the cathode comprises between about 65 and 90 percent by weight copper hydroxide.

28. The cell of claim 15 wherein the copper hydroxide additive is in particulate form having an average particle size between about 1 and 100 micron.

29. The cell of claim 15 wherein the cathode comprises less than 100 parts total iron and chromium per million parts by weight of said cathode.

30. The cell of claim 15 wherein said cell comprises less than 50 parts by weight mercury per million parts total cell weight.